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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,609	10/24/2003	Brian K. Kirkpatrick	TI 36224	8822

23494 7590 12/07/2004

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EXAMINER

DANG, PHUC T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 12/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/692,609	Applicant(s) KIRKPATRICK ET AL.	
	Examiner PHUC T DANG	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) 11-20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>102403</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on October 24, 2003 is acceptable.

Information Disclosure Statement

2. The office acknowledges receipt of the following items from the applicant:

Information Disclosure Statement (IDS) filed on October 24, 2003.

Specification

3. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claims 11-20 are objected to because of the informalities followings:

In claim 11, line 14, a term "transistors structures" should replace by -- transistor structures

--.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

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and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 5-6 and 7-9 are rejected under 35 U.S.C. 102 (e) as being anticipated by Jin et al., hereinafter "Jin" (U.S. 2004/0150012 A1).

Regarding claim 1, Jin discloses a process of manufacturing a semiconductor device, comprising:

plasma etching through a patterned hardmask layer (45, Fig. 2A) located over a semiconductor substrate (10, Fig. 2A) wherein the plasma etching forms a modified layer (56, Fig. 2B) on the hardmask layer (45, Fig. 2B); and

removing at least a substantial portion of the modified layer (56, Fig. 2C) by exposing the modified layer to a post plasma clean process [col. 4, paragraph [0043]].

Regarding claim 5, Jin discloses a process further including removing a photoresist layer (60, Fig. 2A) from the patterned hardmask prior to the plasma etching [Figs. 2A-2C].

Regarding claim 6, the process wherein a step of removing includes removing all of the modified layer to leave an unmodified hardmask layer [Fig. 2C].

Regarding claims 7-9, Jin discloses a step further including forming an oxide liner (80, Fig. 2D) in the trench before a step of removing [Figs. 2A-2C].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jin in view of Hung et al., hereinafter "Hung" (U.S. Patent No. 6,750,117 B1).

Jin discloses all the features of the claimed invention as discussed above, but does not disclose a step of removing includes exposing the modified layer to an isotropic etch by phosphoric acid.

Hung, however, discloses a step of removing includes exposing the modified layer to an isotropic etch by phosphoric acid [col. 2, lines 59-65].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to apply the teaching of Hung to Jin discussed above such that a step of removing includes exposing the modified layer to an isotropic etch by phosphoric acid for a purpose of improving the process.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jin in view of Wells et al., hereinafter "Wells" (U.S. Patent No. 6,095,882).

Jin discloses all the features of the claimed invention as discussed above, but does not disclose a step of plasma etching includes etching through a patterned silicon, silicon nitride, silicon carbide or oxynitride hardmask.

Wells, however, discloses a step of plasma etching includes etching through a patterned silicon, silicon nitride, silicon carbide or oxynitride hardmask [col. 6, lines 57-59].

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of Wells to Jin discussed above such that a step of plasma etching includes etching through a patterned silicon, silicon nitride, silicon carbide or oxynitride hardmask for a purpose of improving the process.

8. Jin discloses the claimed invention except for the process parameters as claimed in claim 10. However, the selection of the claimed process parameters would have been obvious to one having ordinary skill in the art at the time the invention was made to improve the process, since it is well settled that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Allowable Subject Matter

9. Claims 11-20 would be allowed if the independent claim 11 is rewritten or amended to overcome the objection(s) set forth in this Office action.

The following is a statement of reason for the indication of allowable subject matter:

Claims 11-20 are considered allowable since the prior art of record and the considered pertinent to the applicant's disclosure does not teach or suggest the claimed invention having a step of forming interconnects within dielectric layers located over the transistor structures that interconnect the transistor structures to form an operative integrated circuit.

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Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.

12. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PD



Primary Examiner

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